

- (Moniliales: Moniliaceae) as a control agent for insects. *Environmental Entomology* 15:281–284.
- Hassan, S. A., and P. A. Oomen. 1985. Integration of biological and chemical control of diseases and minor pests. Pages 145–152 in N. W. Hussey and N. Scopes, eds. *Biological Pest Control: The Glass-house Experience*. Blandford Press, Dorset.
- Heale, J. B. 1987. The potential impact of fungal genetics and molecular biology on biological control, with particular reference to entomopathogens. Pages 211–234 in M. N. Burger, ed. *Fungi in Biological Control Systems*. University Press, Manchester.
- Heintz, C., and R. Blaich. 1990. *Verticillium lecanii* as a hyperparasite of grapevine powdery mildew (*Uncinula necator*). *Vitis* 29:229–232.
- Hussey, N. W. 1984. Biological control in integrated pest control programs in Europe. Pages 128–136 in G. Allen and A. Rada, eds. *The Role of Biological Control in Pest Management*. University of Ottawa Press, Ottawa.
- Jackson, C. W. 1984. Genetical studies on the entomopathogenic fungus *Verticillium lecanii* (Zimm.) Viégas. Ph.D. Dissertation, University of London, London. 271 pp.
- Meyer, S. L. F. 1990. Evaluation of potential bio-control agents for soybean cyst nematode. *Mycological Society of America Newsletter* 41:29.
- , and R. N. Huettel. 1991. Comparisons of fungi and fungus-bioregulator combinations for control of *Heterodera glycines*, the soybean cyst nematode. *Journal of Nematology* 23:540.
- , R. N. Huettel, and R. M. Sayre. 1990. Isolation of fungi from *Heterodera glycines* and in vitro bioassays for their antagonism to eggs. *Journal of Nematology* 22:532–537.
- , R. M. Sayre, and R. N. Huettel. 1991. Benomyl tolerance of ten fungi antagonistic to plant-parasitic nematodes. *Journal of Nematology* 23:402–408.
- Papavizas, G. C. 1985. *Trichoderma* and *Gliocladium*: biology, ecology and potential for biocontrol. Pages 23–54 in R. J. Cook, G. A. Zentmyer, and E. B. Cowling, eds. *Annual Review of Phytopathology*. Vol. 23. Annual Reviews, Inc., Palo Alto.
- Puhalla, J. E. 1973. Differences in sensitivity of *Verticillium* species to ultraviolet irradiation. *Phytopathology* 63:1488–1492.
- Rodriguez-Kábana, R., and G. Morgan-Jones. 1988. Potential for nematode control by mycofloras endemic in the tropics. *Journal of Nematology* 20:191–203.
- Uma, N. U., and G. S. Taylor. 1987. Parasitism of leek rust urediniospores by four fungi. *Transactions of the British Mycological Society* 88:335–340.

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### Research Note

## Occurrence of Larval *Contracaecum* sp. (Ascaridida: Anisakidae) in Rio Grande Lesser Sirens, *Siren intermedia texana* (Amphibia: Caudata), from South Texas

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**ABSTRACT:** Unencapsulated third-stage larval anisakid nematodes, *Contracaecum* sp. Railliet and Henry, 1912, were recovered from the coelomic cavity of all of 8 Rio Grande lesser sirens, *Siren intermedia texana* Goin, 1957, from southern Texas. Mean intensity was 2.1 (range 1–5) worms per host. This is the first report of larval *Contracaecum* sp. infecting a caudate amphibian.

**KEY WORDS:** Anisakidae, Ascaridida, Nematoda, *Contracaecum* sp., Caudata, *Siren intermedia texana*, Sirenidae.

The Rio Grande lesser siren, *Siren intermedia texana* Goin, 1957, is a large eellike salamander that ranges from the lower Rio Grande Valley of

Texas to Tamaulipas, Mexico (Martof, 1973; Dixon, 1987). The species inhabits a wide variety of aquatic sites. In Texas, *S. i. texana* is considered an endangered taxon and is afforded protection by the Texas Parks and Wildlife Department.

Although a great deal of information is available on endoparasites of conspecific western lesser sirens, *S. i. nettingi* Goin, 1942 (Nickol, 1972; Dunagan and Miller, 1973; Dyer, 1973; Brooks and Buckner, 1976; Brooks, 1978; Buckner and Nickol, 1979), nothing has been published on parasites of *S. i. texana*. During a morphometric study of *S. i. texana* (McDaniel, 1969), several

sirens were observed to be infected with the anisakid nematode reported here.

During April 1968, the junior author collected 8 adult *S. i. texana* (mean  $\pm$  SD snout-vent length [SVL] =  $228.4 \pm 30.8$ , range = 190–272 mm) by seining, hand, or with wire traps from freshwater ponds in the vicinity of Kingsville, Kleberg County, Texas (27°30'N, 97°51'W). Specimens were killed with a dilute solution of chloreton and a midventral incision was made to expose the viscera. Nematodes were collected from the coelomic cavity and fixed in 70% ethanol. Voucher specimens of hosts are deposited in the Texas A&I University Museum (AIM 574.21, 574.38, 574.43, 574.47, 575.77, 575.94, 575.109, and 575.111). Voucher specimens of *Contracaecum* sp. are deposited in the USNM Helminthological Collection, USDA, Beltsville, Maryland 20705, as USNM 82004.

All of 8 *S. i. texana* were infected with third-stage larvae of the anisakid nematode *Contracaecum* sp. Railliet and Henry, 1912. A total of 17 unencapsulated worms was recovered from the coelomic cavity of 8 sirens; a mean intensity of 2.1 (range 1–5) worms per host. The largest siren (SVL = 272 mm, AIM 574.38) was most heavily infected (5 worms).

Sirens have been reported to feed on a variety of prey items, including fish (Goin, 1957; Duellman and Schwartz, 1958; Altig, 1967; Hanlin, 1978) and crustaceans (Scroggin and Davis, 1956; Altig, 1967). Perhaps immature sirens become infected by ingesting invertebrates (copepods) harboring larval stages of *Contracaecum*, whereas the adults are infected from ingestion of encapsulated third-stage larvae found in fish (see Huizinga, 1967).

In summary, this is the first report of *Contracaecum* sp. from a member of the order Caudata and, to our knowledge, only the second time the parasite has been reported from amphibians. Coy Otero and Ventosa (1984) previously reported larval *Contracaecum* sp. from Cuban treefrogs, *Osteopilus septentrionalis* (Dumeril and Bibron, 1841), and bullfrogs, *Rana catesbeiana* Shaw, 1802, from Cuba.

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#### Literature Cited

- Altig, R. 1967. Food of *Siren intermedia nettingi* in a spring-fed swamp in southern Illinois. *American Midland Naturalist* 77:239–241.

- Brooks, D. R. 1978. Systematic status of proteocephalid cestodes from reptiles and amphibians in North America with descriptions of three new species. *Proceedings of the Helminthological Society of Washington* 45:1–28.
- , and R. L. Buckner. 1976. Some platyhelminth parasites of sirens (Amphibia: Sirenidae) from North America. *Journal of Parasitology* 62: 906–909.
- Buckner, R. L., and B. B. Nickol. 1979. Geographic and host-related variation among species of *Fessisensis* (Acanthocephala) and confirmation of the *Fessisensis fessus* life cycle. *Journal of Parasitology* 65:161–166.
- Coy Otero, A., and I. Ventosa. 1984. Nematodos parasitos de anfibios cubanos. *Poeyana* 269:1–20.
- Dixon, J. R. 1987. *Amphibians and Reptiles of Texas*. Texas A&M University Press, College Station, Texas. 434 pp.
- Duellman, W. E., and A. Schwartz. 1958. Amphibians and reptiles of southern Florida. *Bulletin of the Florida State Museum* 3:181–324.
- Dunagan, T. T., and D. M. Miller. 1973. Some morphological and functional observations on *Fessisensis fessus* Van Cleave (Acanthocephala) from the dwarf salamander, *Siren intermedia* Le Conte. *Proceedings of the Helminthological Society of Washington* 40:209–216.
- Dyer, W. G. 1973. *Falcaustra chabaudi* sp. n. (Nematoda: Kathliniidae) from the western lesser siren, *Siren intermedia nettingi* Goin, 1942. *Journal of Parasitology* 59:994–996.
- Goin, C. J. 1957. Description of a new salamander of the genus *Siren* from the Rio Grande. *Herpetologica* 13:37–42.
- Hanlin, H. G. 1978. Food habits of the greater siren, *Siren lacertina*, in an Alabama coastal plain pond. *Copeia* 1978:358–360.
- Huizinga, H. W. 1967. The life cycle of *Contracaecum multipapillatum* (Von Drasche, 1882) Luckert, 1941 (Nematoda: Heterochelidae). *Journal of Parasitology* 53:368–375.
- Martof, B. S. 1973. *Siren intermedia*. Pages 127.1–127.3 in J. D. Anderson, ed. *Catalogue of American Amphibians and Reptiles*. Society for the Study of Amphibians and Reptiles, American Museum of Natural History, New York.
- McDaniel, V. R. 1969. A morphologic investigation of sirens from southern Texas. Unpublished Master's Thesis, Texas A&I University, Kingsville. 58 pp.
- Nickol, B. B. 1972. *Fessisensis*, a genus of acanthocephalans parasitic in North American poikilotherms. *Journal of Parasitology* 58:282–289.
- Scroggin, J. B., and W. B. Davis. 1956. Food habits of the Texas dwarf siren. *Herpetologica* 12:231–237.